

## REMOTE MANAGEMENT OF PROPERTIES, SUCH AS PROPERTIES FOR ESTABLISHING A VIRTUAL PRIVATE NETWORK

### TECHNICAL FIELD

The present invention is directed to the fields of property management and network security.

### BACKGROUND

A virtual private network ("VPN") uses encryption techniques to provide secure communication between two or more private networks using a public network, such as the Internet.

In view of the increasing ubiquity of public networks like the Internet, VPNs have a number of productive applications. For example, a VPN may be used to replace a wide area network ("WAN"). A business that maintains offices in different cities typically connects the computers in each office with a private local area network ("LAN"). In order to facilitate communications between computers in different offices, such a company would traditionally connect the LANs with a WAN, typically running across dedicated leased lines. While such a WAN is secure, the leased lines it requires typically constitute a significant ongoing expense. Further, the data transfer speed of such WANs often leave much to be desired compared to speeds that can be achieved on the modern Internet. Where each of the offices is or can be connected to the Internet, replacing such a WAN with a VPN can reduce costs while simultaneously increasing data transfer speed. Given the significant economy of this solution, the VPN can be used to connect much smaller offices—such as home offices—that could be connected by the WAN.

Additionally, a VPN may be used to secure communications for more transient applications, such as communications with a user traveling with a portable computer and connecting via an Internet dialup connection for short periods each day from different locations, or communications with a client to install a product for the client over a brief period.

Unfortunately, VPNs have conventionally been both difficult and expensive to establish, and to manage once established. As a result, the widespread adoption of VPNs has been significantly inhibited.

Accordingly, a system for centrally and straightforwardly establishing and managing VPNs would have significant utility. Indeed, a more generalized facility implementing centrally-managed properties more generally would also have significant utility.

## BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a high-level network diagram showing a typical environment in which the facility operates.

Figure 2 is a network diagram from the perspective of a typical single property client that is a network security device.

Figure 3 is a data flow diagram showing data exchanged between a property server and a property client in order to manage properties of the client, also called the client's "configuration."

Figure 4 is a flow diagram showing steps typically performed by the facility in a property client and a property server to maintain a configuration for the property client.

## DETAILED DESCRIPTION

A software facility for centrally managing properties, such as properties establishing a VPN, is described. In some embodiments, the facility enables a user to issue a single instruction to establish a VPN between two or more private networks utilizing a security device in each of the private networks, such as a firewall. In some embodiments, a user can use the facility to establish a VPN by merely selecting the security devices it will connect, and, optionally, a level of security to use. This process is substantially easier for a user than conventional approaches to establishing a VPN.

Each security device may be a specialized device, or a general-purpose computer executing security software. The facility uses templates, together with specific information about the private networks and attributes specified for the VPN, to generate a set

of properties for the security device for each private network, which the facility automatically distributes to the corresponding security devices in order to establish the VPN.

In this manner, the facility greatly reduces the difficulty, and indeed the cost, of establishing a VPN, thereby making VPN use feasible for a wide variety of organizations, and even for individuals.

Embodiments of the facility can remotely manage properties of various types for property clients, which may either be general-purpose computer systems or special-purpose devices. In some embodiments, each property client has an overall property set that it maintains and uses in aspects of its operation, which may include properties managed remotely by the facility. Each property client periodically requests property updates from the facility, enclosing an indication of the generation date of its current overall property set. If the facility has received updates to managed properties for the property client, the facility instructs the property client to transmit its current overall property set to the facility. The facility, when it receives the property client's current overall property set, makes a copy and substitutes for any managed properties in the copy the updated managed properties. If the resultant new overall property set differs from the current overall property set, the facility sends the new overall property set to the property client for use by the property client. Otherwise, the facility instructs the property client to continue to use its current overall property set.

By updating properties in this manner, the facility enables properties of the property clients to be effectively managed remotely. The facility also saves the processing capacity and bandwidth needed to send the overall property set to the facility, and to send a new overall property set to the property client, where these steps are unnecessary.

Figure 1 is a high-level network diagram showing a typical environment in which the facility operates. The facility uses one or more property servers 110 to centrally and/or remotely manage properties for one or more property clients, such as clients 131-135. Each server is typically a general-purpose computer system having one or more processors, memories, non-volatile storage devices, and computer-readable media drives. Each client may be such a general-purpose computer system, or may be a more specialized device, such as a network security device, such as a firewall or gateway.

As part of such property management, the server communicates with each of the clients, such as via the Internet 120. Those skilled in the art will recognize that the server

may communicate with clients via any of a number of types of connections. In some embodiments, the server and clients communicate via a secure connection, such as with encrypted messages sent via the Internet.

In some embodiments, the properties managed for the clients by the server establish, maintain, modify, or terminate VPNs between selected clients. For example, properties managed by the facility create a VPN between clients 134 and 135, and create VPNs between client 132 and each of clients 131 and 133. Those skilled in the art will appreciate that the facility may manage other types of properties on behalf of the clients.

Figure 2 is a network diagram from the perspective of a typical single property client that is a network security device or network gateway. This diagram shows that this client 131, which is connected to the Internet 120, and, therethrough, to the server 110, regulates access between the Internet and nodes 241-243 on a LAN 240. These nodes, and, indeed, any nodes later added to the LAN, are known as protected resources, both relative to the network security device 131, and relative to any VPNs established between the LAN and other private networks.

In some embodiments, VPNs established between the LAN 240 and other private networks are tunneling VPNs implemented with a collection of protocols collectively known as the Internet Protocol Security standard ("IPSec"). The IPSec standard is comprised of protocols such as the following: Authentication Header, which provides an authenticity guarantee for packets; Encapsulating Security Payload, which provides a confidentiality guarantee for packets; IP payload compression, which reduces the size of packets; and Internet Key Exchange, for negotiating encryption keys. IPSec is described in greater detail in R. Thayer, N. Doraswami, and E. Glen, *RFC 2411: IP Security Document Roadmap*, Network Working Group, 1998; and S. Kent and R. Atkinson, *RFC 2401: Security Architecture for the Internet Protocol*, Network Working Group, 1998. Those skilled in the art will recognize that VPNs based upon a variety of other networking protocols may also be established by the facility.

Figure 3 is a data flow diagram showing data exchanged between a property server and a property client in order to manage properties of the client. These properties of the client are also referred to herein as the client's "configuration." As it does periodically, the client 131 sends the server 110 a configuration request 310. The configuration request is a request for any updates to the client's configuration. In some embodiments, the

configuration request contains information indicating the generation date and/or the contents of the configuration currently used by the client, which may be used by the server to determine whether the configuration currently being used by the client is appropriate for continued use. For example, the configuration request may contain a timestamp indicating the time at which the configuration currently being used was generated, or a timestamp indicating when it was most recently modified.

Upon receiving the configuration request, the server replies with a request for existing configuration 320. The request for existing configuration is an instruction to the client to reply with a copy of the configuration currently being used by the client. In some cases, where it can be determined by the server from the information contained in the configuration request that the client should continue using the existing configuration, the server does not send the request for existing configuration as shown, but rather instructs the client to continue using the existing configuration.

Upon receiving the request for existing configuration, the client sends an existing configuration 330, containing a copy of the configuration being used by the client.

When the server receives the existing configuration, it merges the managed properties that it is managing for the client into the existing configuration, which it sends to the client as merged configuration 340. Upon receiving the merged configuration, the client adopts it, thereafter using the merged configuration. Where the server can determine that the merged configuration is identical or insubstantially different from the existing configuration, the server may send the client an instruction to continue using its existing configuration, rather than sending the merged configuration as shown.

Figure 4 is a flow diagram showing steps typically performed by the facility in a property client and a property server to maintain a configuration for the property client. In step 401, if a configurable update interval -- such as one hour -- has expired since the last time the client updated its configuration, then the facility continues in step 402, else these facility continues in step 401 to await the expiration of the update interval. In step 402, the client sends a configuration request to the server, enclosing a timestamp associated with the existing configuration.

In step 451, the server receives the configuration request sent in step 402. In step 452, if the latest update time for the managed properties is later than the time corresponding to the timestamp enclosed in the configuration request, then the facility

continues in step 453 to continue the configuration update process, else these steps conclude. In some embodiments, before these steps conclude, the server sends the client an instruction to continue using its existing configuration (not shown). In step 453, the server sends an instruction to the client to upload a copy of its existing configuration.

In step 403, the client receives the instruction sent in step 453. In step 404, in response to receiving the instruction, the client sends a copy of the existing configuration to the server.

In step 454, the server receives the copy of the existing configuration sent by the client in step 404. In step 455, the server deletes managed properties from the received copy of the existing configuration. In various embodiments, the facility identifies managed properties for deletion from the existing configuration using (1) an indication stored in the properties themselves that they are managed properties; (2) administrative properties among the properties of the configuration identifying the managed properties; (3) a separate indication stored in the server identifying the managed properties among the properties of the configuration; or a similar scheme.

In step 456, the facility merges the current version of properties managed for the client into the existing configuration to maintain a configuration for the property client. In some embodiments, managed properties are specified by an administrator or another user using templates. In order to specify managed properties using a template, the user selects an appropriate template, then either supplies or designates a source for particular data to populate the template. For example, establishing a new VPN may involve using one or more templates to establish properties for each of the security device clients that operate the VPN. In the scenario in which managed properties are specified using templates, the managed properties that are merged into individual client's overall properties may change in a number of ways. As one example, the properties may change when a new template is selected by a user. As another example, the properties may change if a template previously selected by a user to specify properties for a particular client is revised. In this event, the properties for each property client for which that template was selected are modified accordingly.

In step 457, if the merged configuration matches the existing configuration, then the merged configuration need not be sent to the client and these steps conclude, else the facility continues in step 458. If these configurations match, the server may send the client an instruction to continue using its existing configuration (not shown).

The facility may perform the comparison shown in step 457 in a variety of different ways. The facility may directly compare the contents of the merged configuration to the contents of the existing configuration. Alternatively, the facility may generate and compare summaries or digests of the two configurations. For example, the facility may generate digests of the configurations using a hashing algorithm, such as the MD5 message digest algorithm, described in R.L. Rivest, *RFC 1321: The MD5 Message-Digest Algorithm*, Internet Activities Board, 1992. The comparison may either determine whether these two configurations are identical, whether they are equivalent, or whether they are substantially equivalent.

In step 458, the server sends the merged configuration to the client.

In step 405, the client receives the merged configuration sent in step 458. In step 406, the client stores the merged configuration. In step 407, the client restarts to begin using the stored merged configuration.

To more fully describe the facility, its operation is discussed in conjunction with an example below. In the example, the facility merges managed properties into the configuration of a security device causing the security device to participate in a VPN.

Table 1 immediately below shows an initial configuration for a security device protecting the private network 10.32.91.0/24. The properties in this configuration relate to aspects of network protection other than VPNs.

```
1  config.version: 0.1
2  #
3  ##### wg.cfg for Release 4.1
4  ##### (C) 1996-2000 WatchGuard Technologies, Inc.
5  ##### All Rights Reserved
6  #
7
8  config.watchguard.release: shoreline
9  #
10 default.antispam.domain here0
11 rbl.maps.vix.com
12     dul.maps.vix.com
13     rss.maps.vix.com
14     relays.orbs.org
15 here0
16 default.proxies.ftp.incoming.log.accounting: 0
17 default.proxies.ftp.outgoing.log.accounting: 0
18 default.proxies.ftp.outgoing.readonly: 0
19 default.proxies.ftp.readonly: 1
20 #
```

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21 default.proxies.ftp.sessions: 60
22 default.proxies.ftp.site: 0
23 default.proxies.ftp.timeout: 1800
24 default.proxies.http.anonymize: 1
25 default.proxies.http.known_headers here0
26 Accept
27     Accept-Charset
28     Accept-Encoding
29     Accept-Language
30     Accept-Ranges
31     Age
32     Allow # additional
33     Alternates # additional
34     Authorization
35     Cache-Control
36     Connection
37     Content-Base
38     Content-Encoding
39     Content-Language
40     Content-Length
41     Content-Location
42     Content-MD5
43     Content-Range
44     Content-Type
45     Content-Version # additional
46     Cookie # netscapism
47     Date
48     Derived-From # additional
49     ETag
50     Expires
51     From
52     Host
53     If-Modified-Since
54     If-Match
55     If-None-Match
56     If-Range
57     If-Unmodified-Since
58     Keep-Alive # v1.0
59     Last-Modified
60     Link # additional
61     Location
62     Max-Forwards
63     MIME-Version
64     Pragma
65     Proxy-Authenticate
66     Proxy-Authorization
67     Proxy-Connection
68     Public
69     Range
70     Referer
71     Retry-After
72     Set-Cookie # netscapism
73     Server
74     Transfer-Encoding
75     UA-pixels # explorerism
76     UA-color # explorerism
77     UA-OS # explorerism
78     UA-CPU # explorerism
79     Upgrade
80     User-Agent
81     URI # v1.0 (deprecated)
82     Vary
83     Via

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84      Warning
85      WWW-Authenticate
86  here0
87  default.proxies.http.log_access: 1
88  default.proxies.http.no_cookies: 0
89  default.proxies.http.no_submissions: 0
90  default.proxies.http.remove_unknown: 1
91  default.proxies.http.safe_content: 1
92  default.proxies.http.safe_content_types here0
93  text/*
94      image/*
95      audio/*
96      video/*
97  application/x-wls
98  here0
99  default.proxies.http.sigs.applets.cab.deny: yes
100 default.proxies.http.sigs.applets.cab.sig: @MSCF%00%00%00%00
101 default.proxies.http.sigs.applets.java.deny: yes
102 default.proxies.http.sigs.applets.java.sig: @%ca%fe%ba%be
103 default.proxies.http.sigs.applets.ocx.deny: yes
104 default.proxies.http.sigs.applets.ocx.sig:
105 @%5a%4d%00%90%00%03%00%00%00%04%00%00%ff%ff%00%00
106 default.proxies.http.sigs.http_reqs here0
107 @GET%20
108 @HEAD%20
109 @POST%20
110 @PUT%20
111 @CHECKIN%20
112 @CHECKOUT%20
113 @DELETE%20
114 @LINK%20
115 @UNLINK%20
116 @OPTIONS%20
117 @PATCH%20
118 @TRACE%20
119 here0
120 default.proxies.http.sigs.http_resps: @HTTP/
121 default.proxies.http.timeout: 600
122 default.proxies.realaudio.incoming.log.accounting: 0
123 default.proxies.realaudio.outgoing.log.accounting: 0
124 default.proxies.smtp.incoming.allowed.addrs.8bit: yes
125 default.proxies.smtp.incoming.allowed.addrs.chars: _-.,+=%*/~!^&?
126 default.proxies.smtp.incoming.allowed.addrs.routes: no
127 default.proxies.smtp.incoming.allowed.esmtp.etrn: no
128 default.proxies.smtp.incoming.allowed.from: *
129 default.proxies.smtp.incoming.allowed.headers here0
130 X-*
131 Received
132 From
133 To
134 cc
135 bcc
136 Resent-To
137 Resent-cc
138 Resent-bcc
139 Resent-Message-ID
140 Resent-Reply-To
141 Resent-From
142 Resent-Date
143 Resent-Sender
144 Message-ID
145 In-Reply-To
146 References

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147 Keywords
148 Subject
149 Comments
150 Encrypted
151 Date
152 Reply-To
153 Return-path
154 Sender
155 MIME-Version
156 Content-Type
157 Content-Language
158 Content-Length
159 Content-Disposition
160 Content-Transfer-Encoding
161 Content-ID
162 Content-Description
163 Content-MD5
164 Encoding
165 Precedence
166 Approved-By
167 Status
168 here0
169 default.proxies.smtp.incoming.allowed.safe_content: yes
170 default.proxies.smtp.incoming.allowed.safe_content.deny_msg: [Attachment denied
171 by WatchGuard SMTP proxy (type "%t", filename "%f")]
172 default.proxies.smtp.incoming.allowed.safe_content.types here0
173 text/*
174 image/*
175 audio/*
176 video/*
177 multipart/*
178 message/*
179 application/x-wls
180 here0
181 default.proxies.smtp.incoming.allowed.to: *
182 default.proxies.smtp.incoming.denied.file_patterns: *.bat *.exe *.hta *.js *.vb?
183 *.wsf *.wsh *.shs
184 default.proxies.smtp.incoming.denied.from:
185 default.proxies.smtp.incoming.denied.to:
186 default.proxies.smtp.incoming.log.accounting: 0
187 default.proxies.smtp.incoming.timeout: 600
188 default.proxies.smtp.max.size: 3000
189 default.proxies.smtp.max.to: 99
190 default.proxies.smtp.outgoing.allowed.headers here0
191 From
192 To
193 cc
194 bcc
195 Resent-To
196 Resent-cc
197 Resent-bcc
198 Resent-Message-ID
199 Resent-Reply-To
200 Resent-From
201 Resent-Date
202 Message-ID
203 In-Reply-To
204 References
205 Keywords
206 Subject
207 Comments
208 Encrypted
209 Date

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210 Reply-To
211 MIME-Version
212 Content-Type
213 Content-Language
214 Content-Length
215 Content-Disposition
216 Content-Transfer-Encoding
217 Content-ID
218 Content-Description
219 Content-MD5
220 Encoding
221 Precedence
222 Approved-By
223 Status
224 here0
225 default.proxies.smtp.outgoing.domain:
226 default.proxies.smtp.outgoing.log.accounting: 0
227 default.proxies.smtp.outgoing.masquerade.from:
228 default.proxies.smtp.outgoing.masquerade.from.except:
229 default.proxies.smtp.outgoing.masquerade.mime: no
230 default.proxies.smtp.outgoing.masquerade.msgid: no
231 default.proxies.smtp.outgoing.timeout: 600
232
233 #
234 ##### handsfree installer
235 #
236 installer.enable: no
237 installer.force.trusted.optional.loopback: no
238 installer.frontpanel.enable: no
239 installer.loopback.detect: no
240 networking.bastion: eth2
241 networking.bridge.external: 192.168.49.254
242 networking.bridge.optional:
243 networking.dhcpd.default.default_lease_time: 21600
244 networking.dhcpd.default.max_lease_time: 43200
245 networking.dhcpd.default.router: auto
246 networking.dhcpd.default.serverid: auto
247 networking.dhcpd.default.subnet: auto
248 networking.dhcpd.devices: trusted optional
249 #
250 ##### DHCP server
251 #
252 networking.dhcpd.enable: no
253 networking.domain_suffix:
254 networking.ethernet.00: eth0 192.168.49.91 192.168.49.0 255.255.255.0
255 192.168.49.254
256 networking.ethernet.01: eth1 10.32.91.91 10.32.91.0 255.255.255.0 none
257 networking.ethernet.02:
258
259 #
260 ##### Some global networking options
261 ##### These shouldn't need to change
262 #
263
264 networking.external: eth0
265 networking.hostname: watchguard
266 networking.nameservice.remote.dns.0:
267 networking.nameservice.remote.dns.1:
268 networking.nameservice.remote.wins.0:
269 networking.nameservice.remote.wins.1:
270 networking.oob.chat.ttyS0: "" +\p+\p+\d\r\pATH "" \dAT&F OK ATE0 OK ATS0=1 OK
271 networking.oob.chat.ttyS2: "" +\p+\p+\d\r\pATH "" \dAT&F OK ATE0 OK ATS0=1 OK
272

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273 #
274 ##### out-of-band
275 #
276 networking.oob.debug: no
277 networking.oob.ppp.ttyS0: 38400 crtscts silent 192.168.254.1:192.168.254.2
278 networking.oob.ppp.ttyS2: 38400 crtscts silent 192.168.254.1:192.168.254.2
279 options.controld.control_tty: /dev/ttyS0
280 #
281 options.controld.log_host: 192.168.50.21=020d0d4929587f6b162f0473457a6861
282 options.controld.logdb_entries: 100000
283 options.controld.notify_host:
284 options.controld.serial_config: 1
285 options.controld.tcp_config: write
286 options.default.incoming.command:
287 options.default.incoming.count: 10
288 #
289 options.default.incoming.hostile: no
290 options.default.incoming.interval: 15
291 options.default.incoming.log_broadcasts: no
292 options.default.incoming.log_level: warning
293 options.default.incoming.notification: no
294 options.default.outgoing.command:
295 options.default.outgoing.count: 10
296 options.default.outgoing.interval: 15
297 options.default.outgoing.log_broadcasts: no
298 options.default.outgoing.log_level: debug
299 options.default.outgoing.notification: no
300 #
301 options.fail-over.bcast_cookie: true
302 options.fail-over.hb_delay: 5
303 options.fail-over.state: 5
304 options.filter.vpn_bypass: no
305 options.hostile_port.command:
306 options.hostile_port.count:
307 options.hostile_port.hostile: no
308 options.hostile_port.interval:
309 #
310 options.hostile_port.list:
311 options.hostile_port.log_level: warning
312 options.hostile_port.notification: no
313 options.hostile_site.command:
314 options.hostile_site.count:
315 options.hostile_site.duration: 20
316 options.hostile_site.exceptions:
317 options.hostile_site.interval:
318 #
319 options.hostile_site.list:
320 options.hostile_site.log_level: info
321 options.hostile_site.notification: no
322 options.ipoptions.block: no
323 options.ipoptions.command:
324 options.ipoptions.count: 0
325 options.ipoptions.interval: 0
326 options.ipoptions.log_level: warning
327 options.ipoptions.notification: no
328 options.masquerade.tcp.fin.timeout: 15
329 options.masquerade.tcp.timeout: 43205
330 options.masquerade.udp.timeout: 15
331 options.notification.interval: 60
332 #
333 options.notification.mail_address: nobody
334 options.notification.pager_code:
335 options.notification.pager_num:

```

```

336 #
337 options.probe.address: no
338 options.probe.address.command:
339 options.probe.address.count: 10
340 options.probe.address.hostile: 1
341 options.probe.address.interval: 15
342 options.probe.address.log_level: info
343 options.probe.address.notification: no
344 options.probe.port: no
345 options.probe.port.command:
346 options.probe.port.count: 10
347 options.probe.port.hostile: 1
348 options.probe.port.interval: 15
349 options.probe.port.log_level: warning
350 options.probe.port.notification: no
351 #
352 options.proxies.http.webblocker.denymsg: Request blocked by WebBlocker
353 options.services.block_nonestablished_tcp: yes
354 options.services.dynamic.timeout.tcp: 43200
355 options.services.dynamic.timeout.tcp.fin: 10
356 options.services.dynamic.timeout.tcp.linger: 10
357 options.services.dynamic.timeout.tcp_port_80: 0
358 options.services.dynamic.timeout.udp: 10
359 options.services.log_nonsyn_tcp: no
360 #
361 options.services.reject_denied: yes
362 options.simple_nat.enabled: 1
363 options.simple_nat.list: trusted-external
364 #
365 ##### Various options
366 #
367 options.spoofing.block: no
368 options.spoofing.command:
369 options.spoofing.count: 10
370 options.spoofing.interval: 15
371 options.spoofing.log_level: debug
372 options.spoofing.notification: no
373 #
374 #
375 ##### Receive filter scripts
376 #
377
378 scripts.receive.10 here0
379 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
380 # All Rights Reserved
381
382 if (isoob(interface)) {
383     if (ismyipaddr(dest)) allow
384     deny
385 }
386 here0
387 scripts.receive.20 here0
388 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
389 # All Rights Reserved
390
391 builtin_options
392 builtin_spoof
393
394 if (isoutside(interface)) {
395     builtin_hostile_sites
396 }
397
398 # Check against known IP exploits

```

```

399 if (protocol == tcp && !ack && !syn && !rst) {
400     log(error)
401     deny
402 }
403
404 # Deny certain fragments
405 if (frag & 0xlfff) {
406     if (protocol == tcp && ((frag & 0xlfff) == 1)) {
407         log(error)
408         deny
409     }
410 }
411 here0
412 scripts.receive.80 here0
413 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
414 # All Rights Reserved
415
416 builtin_in_dynamic
417 builtin_in_any
418
419 switch (protocol) {
420 case tcp:
421     if (length >= ihl + 14) {
422
423         if (isoutside(interface)) builtin_hostile_dports
424
425         builtin_in_tcp
426
427         # add any other tcp filter rules here
428     }
429     break
430
431 case udp:
432     if (length >= ihl + 4) {
433
434         if (isoutside(interface)) builtin_hostile_dports
435
436         builtin_in_udp
437
438         # add any other udp filter rules here
439     }
440     break
441
442 case icmp:
443     if (length >= ihl + 2) {
444         builtin_in_icmp
445
446         if (icmp_type == dest_unreachable ||
447             icmp_type == source_quench ||
448             icmp_type == time_exceeded ||
449             icmp_type == parameter_problem ||
450             icmp_type == info_reply ||
451             icmp_type == address_reply ||
452             icmp_type == timestamp_reply) {
453             allow
454         }
455     }
456     break
457
458 default:
459     builtin_in_ip
460
461

```

```

462 }
463 here0
464 scripts.receive.99 here0
465 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
466 # All Rights Reserved
467 builtin_default
468 here0
469
470 #
471 ##### Startup script. Used to splice commands
472 #
473
474 scripts.startup.00 here0
475 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
476 # All Rights Reserved
477 here0
478
479 #
480 ##### Transmit filter scripts
481 #
482
483 scripts.transmit.00: allow
484 services.WatchGuard.comment: Service added on February 10, 2001
485 services.WatchGuard.icon_name: watchguard
486 services.WatchGuard.incoming.allowed.command:
487 services.WatchGuard.incoming.allowed.count: 10
488 services.WatchGuard.incoming.allowed.interval: 15
489 services.WatchGuard.incoming.allowed.log_level: none
490 services.WatchGuard.incoming.allowed.notification: no
491 services.WatchGuard.incoming.denied.command:
492 services.WatchGuard.incoming.denied.count: 10
493 services.WatchGuard.incoming.denied.hostile: no
494 services.WatchGuard.incoming.denied.interval: 15
495 services.WatchGuard.incoming.denied.log_level: debug
496 services.WatchGuard.incoming.denied.notification: no
497 services.WatchGuard.incoming.filter: allow
498 services.WatchGuard.incoming.hosts.external: Any
499 services.WatchGuard.incoming.hosts.internal: firebox
500 services.WatchGuard.incoming.nat:
501 services.WatchGuard.list: old new
502 services.WatchGuard.new.client_ports: client
503 services.WatchGuard.new.port_number: 4105
504 services.WatchGuard.new.protocol: tcp
505 services.WatchGuard.old.client_ports: client
506 services.WatchGuard.old.port_number: 4103
507 services.WatchGuard.old.protocol: tcp
508 services.WatchGuard.outgoing.allowed.command:
509 services.WatchGuard.outgoing.allowed.count: 10
510 services.WatchGuard.outgoing.allowed.interval: 15
511 services.WatchGuard.outgoing.allowed.log_level: none
512 services.WatchGuard.outgoing.allowed.notification: no
513 services.WatchGuard.outgoing.denied.command:
514 services.WatchGuard.outgoing.denied.count: 10
515 services.WatchGuard.outgoing.denied.interval: 15
516 services.WatchGuard.outgoing.denied.log_level: debug
517 services.WatchGuard.outgoing.denied.notification: no
518 services.WatchGuard.outgoing.filter: allow
519 services.WatchGuard.outgoing.hosts.external: Any
520 services.WatchGuard.outgoing.hosts.internal: Any
521 services.WatchGuard.protocol: multi
522
523 #
524 ##### Client programs need to set the following, at a minimum:

```

```

525 #####
526 ##### networking.ethernet.dd: for each network interface
527 ##### networking.routes.dd: for each gateway (except the default)
528 ##### networking.bridge.optional: for bridged hosts on the opt net
529 ##### networking.bridge.external: for bridged hosts on the ext net
530 ##### options.aliases.* for host aliases
531 ##### services.* for services
532 #

```

TABLE 1

When the property server determines that the configuration shown in Table 1 has a date earlier than the most recent modification to managed properties, the server instructs the client to send the initial configuration to the server. At the server, the facility deletes any managed properties in the initial configuration (here there are none), then merges in the current managed properties maintained on the server. The resulting merged configuration is shown immediately below Table 2.

```

1 config.version: 0.1
2 config.watchguard.dvcp.default_lease_interval: 30
3 config.watchguard.dvcp.enable: 1
4 config.watchguard.dvcp.server.00.ip: 192.168.49.94
5 config.watchguard.dvcp.server.00.secret: Ce&#y3n~%oJoF.Z7kRSHVuG19u=3i$
6 config.watchguard.id: 192.168.49.91
7 #
8 ##### wg.cfg for Release 4.1
9 ##### (C) 1996-2000 WatchGuard Technologies, Inc.
10 ##### All Rights Reserved
11 #
12
13 config.watchguard.release: shoreline
14 #
15 default.antisipam.domain here0
16 rbl.maps.vix.com
17     dul.maps.vix.com
18     rss.maps.vix.com
19     relays.orbs.org
20 here0
21 default.proxies.ftp.incoming.log.accounting: 0
22 default.proxies.ftp.outgoing.log.accounting: 0
23 default.proxies.ftp.outgoing.readonly: 0
24 default.proxies.ftp.readonly: 1
25 #
26 default.proxies.ftp.sessions: 60
27 default.proxies.ftp.site: 0
28 default.proxies.ftp.timeout: 1800
29 default.proxies.http.anonymize: 1
30 default.proxies.http.known_headers here0
31 Accept
32     Accept-Charset
33     Accept-Encoding
34     Accept-Language

```



```

35 Accept-Ranges
36 Age
37 Allow # additional
38 Alternates # additional
39 Authorization
40 Cache-Control
41 Connection
42 Content-Base
43 Content-Encoding
44 Content-Language
45 Content-Length
46 Content-Location
47 Content-MD5
48 Content-Range
49 Content-Type
50 Content-Version # additional
51 Cookie # netscapism
52 Date
53 Derived-From # additional
54 ETag
55 Expires
56 From
57 Host
58 If-Modified-Since
59 If-Match
60 If-None-Match
61 If-Range
62 If-Unmodified-Since
63 Keep-Alive # v1.0
64 Last-Modified
65 Link # additional
66 Location
67 Max-Forwards
68 MIME-Version
69 Pragma
70 Proxy-Authenticate
71 Proxy-Authorization
72 Proxy-Connection
73 Public
74 Range
75 Referer
76 Retry-After
77 Set-Cookie # netscapism
78 Server
79 Transfer-Encoding
80 UA-pixels # explorerism
81 UA-color # explorerism
82 UA-OS # explorerism
83 UA-CPU # explorerism
84 Upgrade
85 User-Agent
86 URI # v1.0 (deprecated)
87 Vary
88 Via
89 Warning
90 WWW-Authenticate
91 here0
92 default.proxies.http.log_access: 1
93 default.proxies.http.no_cookies: 0
94 default.proxies.http.no_submissions: 0
95 default.proxies.http.remove_unknown: 1
96 default.proxies.http.safe_content: 1
97 default.proxies.http.safe_content_types here0

```

```

98 text/*
99     image/*
100     audio/*
101     video/*
102     application/x-wls
103 here0
104 default.proxies.http.sigs.applets.cab.deny: yes
105 default.proxies.http.sigs.applets.cab.sig: @MSCF%00%00%00%00
106 default.proxies.http.sigs.applets.java.deny: yes
107 default.proxies.http.sigs.applets.java.sig: @%ca%fe%ba%be
108 default.proxies.http.sigs.applets.ocx.deny: yes
109 default.proxies.http.sigs.applets.ocx.sig:
110 @%5a%4d%00%90%00%03%00%00%00%04%00%00%ff%ff%00%00
111 default.proxies.http.sigs.http_reqs here0
112 @GET%20
113     @HEAD%20
114     @POST%20
115     @PUT%20
116     @CHECKIN%20
117     @CHECKOUT%20
118     @DELETE%20
119     @LINK%20
120     @UNLINK%20
121     @OPTIONS%20
122     @PATCH%20
123     @TRACE%20
124 here0
125 default.proxies.http.sigs.http_resps: @HTTP/
126 default.proxies.http.timeout: 600
127 default.proxies.realaudio.incoming.log.accounting: 0
128 default.proxies.realaudio.outgoing.log.accounting: 0
129 default.proxies.smtp.incoming.allowed.addrs.8bit: yes
130 default.proxies.smtp.incoming.allowed.addrs.chars: _- .+=%*/~!^&?
131 default.proxies.smtp.incoming.allowed.addrs.routes: no
132 default.proxies.smtp.incoming.allowed.esmtp.etrn: no
133 default.proxies.smtp.incoming.allowed.from: *
134 default.proxies.smtp.incoming.allowed.headers here0
135 X-*
136 Received
137 From
138 To
139 cc
140 bcc
141 Resent-To
142 Resent-cc
143 Resent-bcc
144 Resent-Message-ID
145 Resent-Reply-To
146 Resent-From
147 Resent-Date
148 Resent-Sender
149 Message-ID
150 In-Reply-To
151 References
152 Keywords
153 Subject
154 Comments
155 Encrypted
156 Date
157 Reply-To
158 Return-path
159 Sender
160 MIME-Version

```

```

161 Content-Type
162 Content-Language
163 Content-Length
164 Content-Disposition
165 Content-Transfer-Encoding
166 Content-ID
167 Content-Description
168 Content-MD5
169 Encoding
170 Precedence
171 Approved-By
172 Status
173 here0
174 default.proxies.smtp.incoming.allowed.safe_content: yes
175 default.proxies.smtp.incoming.allowed.safe_content.deny_msg: [Attachment denied
176 by WatchGuard SMTP proxy (type "%t", filename "%f")]
177 default.proxies.smtp.incoming.allowed.safe_content.types here0
178 text/*
179 image/*
180 audio/*
181 video/*
182 multipart/*
183 message/*
184 application/x-wls
185 here0
186 default.proxies.smtp.incoming.allowed.to: *
187 default.proxies.smtp.incoming.denied.file_patterns: *.bat *.exe *.hta *.js *.vb?
188 *.wsf *.wsh *.shs
189 default.proxies.smtp.incoming.denied.from:
190 default.proxies.smtp.incoming.denied.to:
191 default.proxies.smtp.incoming.log.accounting: 0
192 default.proxies.smtp.incoming.timeout: 600
193 default.proxies.smtp.max.size: 3000
194 default.proxies.smtp.max.to: 99
195 default.proxies.smtp.outgoing.allowed.headers here0
196 From
197 To
198 cc
199 bcc
200 Resent-To
201 Resent-cc
202 Resent-bcc
203 Resent-Message-ID
204 Resent-Reply-To
205 Resent-From
206 Resent-Date
207 Message-ID
208 In-Reply-To
209 References
210 Keywords
211 Subject
212 Comments
213 Encrypted
214 Date
215 Reply-To
216 MIME-Version
217 Content-Type
218 Content-Language
219 Content-Length
220 Content-Disposition
221 Content-Transfer-Encoding
222 Content-ID
223 Content-Description

```

```

224 Content-MD5
225 Encoding
226 Precedence
227 Approved-By
228 Status
229 here0
230 default.proxies.smtp.outgoing.domain:
231 default.proxies.smtp.outgoing.log.accounting: 0
232 default.proxies.smtp.outgoing.masquerade.from:
233 default.proxies.smtp.outgoing.masquerade.from.except:
234 default.proxies.smtp.outgoing.masquerade.mime: no
235 default.proxies.smtp.outgoing.masquerade.msgid: no
236 default.proxies.smtp.outgoing.timeout: 600
237 dvcp.options.aliases.dvcp_local_nets: 10.32.91.0/24
238 dvcp.options.aliases.dvcp_nets: 10.32.94.0/24
239
240 #
241 ##### handsfree installer
242 #
243 installer.enable: no
244 installer.force.trusted.optional.loopback: no
245 installer.frontpanel.enable: no
246 installer.loopback.detect: no
247 networking.bastion: eth2
248 networking.bridge.external: 192.168.49.254
249 networking.bridge.optional:
250 networking.dhcpd.default.default_lease_time: 21600
251 networking.dhcpd.default.max_lease_time: 43200
252 networking.dhcpd.default.router: auto
253 networking.dhcpd.default.serverid: auto
254 networking.dhcpd.default.subnet: auto
255 networking.dhcpd.devices: trusted optional
256 #
257 ##### DHCP server
258 #
259 networking.dhcpd.enable: no
260 networking.domain_suffix:
261 networking.ethernet.00: eth0 192.168.49.91 192.168.49.0 255.255.255.0
262 192.168.49.254
263 networking.ethernet.01: eth1 10.32.91.91 10.32.91.0 255.255.255.0 none
264 networking.ethernet.02:
265
266 #
267 ##### Some global networking options
268 ##### These shouldn't need to change
269 #
270
271 networking.external: eth0
272 networking.hostname: watchdog
273 networking.ipsec.policy.inbound.000.disposition: secure
274 networking.ipsec.policy.inbound.000.dst_ip: 10.32.91.0/24
275 networking.ipsec.policy.inbound.000.dvcp: true
276 networking.ipsec.policy.inbound.000.src_ip: 10.32.94.0/24
277 networking.ipsec.policy.inbound.000.tunnelname: barf91-barf94
278 networking.ipsec.policy.outbound.000.disposition: secure
279 networking.ipsec.policy.outbound.000.dst_ip: 10.32.94.0/24
280 networking.ipsec.policy.outbound.000.dvcp: true
281 networking.ipsec.policy.outbound.000.src_ip: 10.32.91.0/24
282 networking.ipsec.policy.outbound.000.tunnelname: barf91-barf94
283 networking.ipsec.remote_gw.barf94.dvcp: true
284 networking.ipsec.remote_gw.barf94.id: 192.168.49.94
285 networking.ipsec.remote_gw.barf94.id_type: ID_USER_FQDN
286 networking.ipsec.remote_gw.barf94.ike_prefs: agg

```

```

287 networking.ipsec.remote_gw.barf94.ip: 192.168.49.94
288 networking.ipsec.remote_gw.barf94.myid_type: ID_USER_FQDN
289 networking.ipsec.remote_gw.barf94.sharedkey: p@x2)KOp)KpX)g*}}m_%TMjdch~
290 networking.ipsec.remote_gw.barf94.type: isakmp
291 networking.ipsec.tunnel.barf91-barf94.dvcp: true
292 networking.ipsec.tunnel.barf91-barf94.remote_gw: barf94
293 networking.ipsec.tunnel.barf91-barf94.sap.00.esp.alg: 2
294 networking.ipsec.tunnel.barf91-barf94.sap.00.esp.authalg: 2
295 networking.ipsec.tunnel.barf91-barf94.sap.00.life.kbytes: 8192
296 networking.ipsec.tunnel.barf91-barf94.sap.00.life.seconds: 86400
297 networking.ipsec.tunnel.barf91-barf94.sap.00.type: ESP
298 networking.nameservice.remote.dns.0:
299 networking.nameservice.remote.dns.1:
300 networking.nameservice.remote.wins.0:
301 networking.nameservice.remote.wins.1:
302 networking.oob.chat.ttyS0: "" +\p+\p+\d\r\PATH "" \dAT&F OK ATE0 OK ATS0=1 OK
303 networking.oob.chat.ttyS2: "" +\p+\p+\d\r\PATH "" \dAT&F OK ATE0 OK ATS0=1 OK
304
305 #
306 ##### out-of-band
307 #
308 networking.oob.debug: no
309 networking.oob.ppp.ttyS0: 38400 crtscts silent 192.168.254.1:192.168.254.2
310 networking.oob.ppp.ttyS2: 38400 crtscts silent 192.168.254.1:192.168.254.2
311 options.aliases.dvcp_local_nets: 10.32.91.0/24
312 options.aliases.dvcp_nets: 10.32.94.0/24
313 options.controlld.control_tty: /dev/ttyS0
314 #
315 options.controlld.log_host: 192.168.50.21=020d0d4929587f6b162f0473457a6861
316 options.controlld.logdb_entries: 100000
317 options.controlld.notify_host:
318 options.controlld.serial_config: 1
319 options.controlld.tcp_config: write
320 options.default.incoming.command:
321 options.default.incoming.count: 10
322 #
323 options.default.incoming.hostile: no
324 options.default.incoming.interval: 15
325 options.default.incoming.log_broadcasts: no
326 options.default.incoming.log_level: warning
327 options.default.incoming.notification: no
328 options.default.outgoing.command:
329 options.default.outgoing.count: 10
330 options.default.outgoing.interval: 15
331 options.default.outgoing.log_broadcasts: no
332 options.default.outgoing.log_level: debug
333 options.default.outgoing.notification: no
334 #
335 options.fail-over.bcast_cookie: true
336 options.fail-over.hb_delay: 5
337 options.fail-over.state: 5
338 options.filter.vpn_bypass: no
339 options.hostile_port.command:
340 options.hostile_port.count:
341 options.hostile_port.hostile: no
342 options.hostile_port.interval:
343 #
344 options.hostile_port.list:
345 options.hostile_port.log_level: warning
346 options.hostile_port.notification: no
347 options.hostile_site.command:
348 options.hostile_site.count:
349 options.hostile_site.duration: 20

```

```

350 options.hostile_site.exceptions:
351 options.hostile_site.interval:
352 #
353 options.hostile_site.list:
354 options.hostile_site.log_level: info
355 options.hostile_site.notification: no
356 options.ipoptions.block: no
357 options.ipoptions.command:
358 options.ipoptions.count: 0
359 options.ipoptions.interval: 0
360 options.ipoptions.log_level: warning
361 options.ipoptions.notification: no
362 options.masquerade.tcp.fin.timeout: 15
363 options.masquerade.tcp.timeout: 43205
364 options.masquerade.udp.timeout: 15
365 options.notification.interval: 60
366 #
367 options.notification.mail_address: nobody
368 options.notification.pager_code:
369 options.notification.pager_num:
370 #
371 options.probe.address: no
372 options.probe.address.command:
373 options.probe.address.count: 10
374 options.probe.address.hostile: 1
375 options.probe.address.interval: 15
376 options.probe.address.log_level: info
377 options.probe.address.notification: no
378 options.probe.port: no
379 options.probe.port.command:
380 options.probe.port.count: 10
381 options.probe.port.hostile: 1
382 options.probe.port.interval: 15
383 options.probe.port.log_level: warning
384 options.probe.port.notification: no
385 #
386 options.proxies.http.webblocker.denymsg: Request blocked by WebBlocker
387 options.services.block_nonestablished_tcp: yes
388 options.services.dynamic.timeout.tcp: 43200
389 options.services.dynamic.timeout.tcp.fin: 10
390 options.services.dynamic.timeout.tcp.linger: 10
391 options.services.dynamic.timeout.tcp_port_80: 0
392 options.services.dynamic.timeout.udp: 10
393 options.services.log_nonsyn_tcp: no
394 #
395 options.services.reject_denied: yes
396 options.simple_nat.enabled: 1
397 options.simple_nat.list: trusted-external
398 #
399 ##### Various options
400 #
401 options.spoofing.block: no
402 options.spoofing.command:
403 options.spoofing.count: 10
404 options.spoofing.interval: 15
405 options.spoofing.log_level: debug
406 options.spoofing.notification: no
407
408 #
409 ##### Receive filter scripts
410 #
411
412 scripts.receive.10 here0

```

```

413 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
414 # All Rights Reserved
415
416 if (isooob(interface)) {
417     if (ismyipaddr(dest)) allow
418     deny
419 }
420 here0
421 scripts.receive.20 here0
422 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
423 # All Rights Reserved
424
425 builtin_options
426 builtin_spoof
427
428 if (isoutside(interface)) {
429     builtin_hostile_sites
430 }
431
432 # Check against known IP exploits
433 if (protocol == tcp && !ack && !syn && !rst) {
434     log(error)
435     deny
436 }
437
438 # Deny certain fragments
439 if (frag & 0xlfff) {
440     if (protocol == tcp && ((frag & 0xlfff) == 1)) {
441         log(error)
442         deny
443     }
444 }
445 here0
446 scripts.receive.80 here0
447 # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
448 # All Rights Reserved
449
450 builtin_in_dynamic
451 builtin_in_any
452
453 switch (protocol) {
454 case tcp:
455     if (length >= ihl + 14) {
456         if (isoutside(interface)) builtin_hostile_dports
457
458         builtin_in_tcp
459
460         # add any other tcp filter rules here
461     }
462     break
463
464 case udp:
465     if (length >= ihl + 4) {
466         if (isoutside(interface)) builtin_hostile_dports
467
468         builtin_in_udp
469
470         # add any other udp filter rules here
471     }
472 }
473
474
475

```

```

476         break
477
478     case icmp:
479         if (length >= ihl + 2) {
480             builtin_in_icmp
481
482             if (icmp_type == dest_unreachable ||
483                 icmp_type == source_quench ||
484                 icmp_type == time_exceeded ||
485                 icmp_type == parameter_problem ||
486                 icmp_type == info_reply ||
487                 icmp_type == address_reply ||
488                 icmp_type == timestamp_reply) {
489                 allow
490             }
491         }
492         break
493
494     default:
495         builtin_in_ip
496     }
497     here0
498     scripts.receive.99 here0
499     # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
500     # All Rights Reserved
501     builtin_default
502     here0
503
504     #
505     ##### Startup script. Used to splice commands
506     #
507
508     scripts.startup.00 here0
509     # Copyright (C) 1995-2000 WatchGuard Technologies, Inc.
510     # All Rights Reserved
511     here0
512
513     #
514     ##### Transmit filter scripts
515     #
516
517     scripts.transmit.00: allow
518     services.Any.client_ports:
519     services.Any.comment:
520     services.Any.dvcp: true
521     services.Any.icon_name: any
522     services.Any.incoming.allowed.command:
523     services.Any.incoming.allowed.count: 10
524     services.Any.incoming.allowed.interval: 15
525     services.Any.incoming.allowed.log_level: none
526     services.Any.incoming.allowed.notification: no
527     services.Any.incoming.denied.command:
528     services.Any.incoming.denied.count: 10
529     services.Any.incoming.denied.hostile: no
530     services.Any.incoming.denied.interval: 15
531     services.Any.incoming.denied.log_level: debug
532     services.Any.incoming.denied.notification: no
533     services.Any.incoming.filter: allow
534     services.Any.incoming.hosts.external: dvcp_nets
535     services.Any.incoming.hosts.internal: dvcp_local_nets
536     services.Any.incoming.nat:
537     services.Any.outgoing.allowed.command:
538     services.Any.outgoing.allowed.count: 10

```



```

539 services.Any.outgoing.allowed.interval: 15
540 services.Any.outgoing.allowed.log_level: none
541 services.Any.outgoing.allowed.notification: no
542 services.Any.outgoing.denied.command:
543 services.Any.outgoing.denied.count: 10
544 services.Any.outgoing.denied.interval: 15
545 services.Any.outgoing.denied.log_level: debug
546 services.Any.outgoing.denied.notification: no
547 services.Any.outgoing.filter: allow
548 services.Any.outgoing.hosts.external: dvcp_nets
549 services.Any.outgoing.hosts.internal: dvcp_local_nets
550 services.Any.port_number:
551 services.Any.protocol: Any
552 services.WatchGuard.comment: Service added on February 10, 2001
553 services.WatchGuard.icon_name: watchguard
554 services.WatchGuard.incoming.allowed.command:
555 services.WatchGuard.incoming.allowed.count: 10
556 services.WatchGuard.incoming.allowed.interval: 15
557 services.WatchGuard.incoming.allowed.log_level: none
558 services.WatchGuard.incoming.allowed.notification: no
559 services.WatchGuard.incoming.denied.command:
560 services.WatchGuard.incoming.denied.count: 10
561 services.WatchGuard.incoming.denied.hostile: no
562 services.WatchGuard.incoming.denied.interval: 15
563 services.WatchGuard.incoming.denied.log_level: debug
564 services.WatchGuard.incoming.denied.notification: no
565 services.WatchGuard.incoming.filter: allow
566 services.WatchGuard.incoming.hosts.external: Any
567 services.WatchGuard.incoming.hosts.internal: firebox
568 services.WatchGuard.incoming.nat:
569 services.WatchGuard.list: old new
570 services.WatchGuard.new.client_ports: client
571 services.WatchGuard.new.port_number: 4105
572 services.WatchGuard.new.protocol: tcp
573 services.WatchGuard.old.client_ports: client
574 services.WatchGuard.old.port_number: 4103
575 services.WatchGuard.old.protocol: tcp
576 services.WatchGuard.outgoing.allowed.command:
577 services.WatchGuard.outgoing.allowed.count: 10
578 services.WatchGuard.outgoing.allowed.interval: 15
579 services.WatchGuard.outgoing.allowed.log_level: none
580 services.WatchGuard.outgoing.allowed.notification: no
581 services.WatchGuard.outgoing.denied.command:
582 services.WatchGuard.outgoing.denied.count: 10
583 services.WatchGuard.outgoing.denied.interval: 15
584 services.WatchGuard.outgoing.denied.log_level: debug
585 services.WatchGuard.outgoing.denied.notification: no
586 services.WatchGuard.outgoing.filter: allow
587 services.WatchGuard.outgoing.hosts.external: Any
588 services.WatchGuard.outgoing.hosts.internal: Any
589 services.WatchGuard.protocol: multi
590
591 #
592 ##### Client programs need to set the following, at a minimum:
593 #####
594 ##### networking.ethernet.dd: for each network interface
595 ##### networking.routes.dd: for each gateway (except the default)
596 ##### networking.bridge.optional: for bridged hosts on the opt net
597 ##### networking.bridge.external: for bridged hosts on the ext net
598 ##### options.aliases.* for host aliases
599 ##### services.* for services
600 #

```

TABLE 2

By comparing the initial configuration shown in Table 1 to the merged configuration shown in Table 2, the facility determines that they are different. As a first matter, the MD5 digests of these two configurations are different. The digest for the initial configuration is 365c991bf1addd2bbe5a76be45e7773f, while the digest for the merged configuration is 07b3fa64aec28be15b9b350f2e374c7a.

As a second matter, it can be seen that the following lines in the merged configuration have been added to the initial configuration: 2-6, 237-238, 273-297, 311-312, and 518-551.

Lines 2-6 contain properties used by the client to communicate with the property server. Lines 237-238 contain administrative properties identifying substantive properties added to the configuration to support the new VPN. These administrative properties can be used by the server to later delete these managed properties.

Lines 273-282 contain properties identifying the protected resources at this client's end of the new VPN (10.32.91.0/24), as well as those at the other end (10.32.94.0/24). Additional protected resources may be listed at each end, which has the effect in some embodiments of establishing a separate VPN between each protected resource at a first end and each protected resource at the other end. This section of the configuration may also contain exceptions within the protected IP address ranges that are not protected. For instance, such an exclusion could omit the IP address 10.32.91.1 from the list of resources protected at this client's end of the new VPN.

Lines 283-290 contain properties identifying the security device at the other end of the VPN, for use in communicating with the other security device to exchange VPN data.

Lines 291-297 contain security properties for the VPN, such as algorithms to be used for tunnel encryption and authentication, as well as how long each dynamically generated session key will be used. These properties are typically specified by a user by selecting one of a number of security templates, each representing a different level of security.

Lines 311 and 312 contain additional administrative properties.

Lines 518-551 contain service properties for the new VPN. These service properties determine which network protocols can be carried by the VPN; that is, which networking applications may use the VPN to exchange data. These service properties are preferably specified by a user by selecting protocols to include or exclude in a services template.

Because this merged configuration differs from the client's existing configuration, the server sends it to the client for adoption by the client. Once this configuration has been adopted by this client, and the corresponding updated configuration has been adopted by the security device at the other end of the VPN, the new VPN will be operative.

Table 3 immediately below shows an example of a template, called a "tunnel template," typically used to specify properties for a VPN.

```

1  config.version: 0.1
2  dvcp.devices.00000.contact_index:
3  dvcp.devices.00000.cookie: 0
4  dvcp.devices.00000.dns.0:
5  dvcp.devices.00000.dns.1:
6  dvcp.devices.00000.domain_suffix:
7  dvcp.devices.00000.enclevel:
8  dvcp.devices.00000.id: 192.168.49.94
9  dvcp.devices.00000.lease.time: 3600
10 dvcp.devices.00000.name: barf94
11 dvcp.devices.00000.props: 00000
12 dvcp.devices.00000.ro: ro
13 dvcp.devices.00000.rw: rw
14 dvcp.devices.00000.secret: pYHouw}M'QC7)`#z%kVwle{dKw6~s6
15 dvcp.devices.00000.type: fbii
16 dvcp.devices.00000.wins.0:
17 dvcp.devices.00000.wins.1:
18 dvcp.devices.00001.contact_index:
19 dvcp.devices.00001.cookie: 0
20 dvcp.devices.00001.dns.0:
21 dvcp.devices.00001.dns.1:
22 dvcp.devices.00001.domain_suffix:
23 dvcp.devices.00001.enclevel:
24 dvcp.devices.00001.id: 192.168.49.91
25 dvcp.devices.00001.lease.time: 3600
26 dvcp.devices.00001.name: barf91
27 dvcp.devices.00001.props: 00000
28 dvcp.devices.00001.ro: ro
29 dvcp.devices.00001.rw: rw
30 dvcp.devices.00001.secret: Ce&#y3n~%oJoF.27kRSHVuG19u=3i$
31 dvcp.devices.00001.type: fbii
32 dvcp.devices.00001.wins.0:
33 dvcp.devices.00001.wins.1:
34 dvcp.license.00: VPNMGR-100-000000-01F785CA
35 dvcp.policies.00000.cookie: 0
36 dvcp.policies.00000.device: 00000
37 dvcp.policies.00000.disposition: secure
38 dvcp.policies.00000.name: Trusted Network

```

```

39 dvcp.policies.00000.resource: 10.32.94.0/24
40 dvcp.policies.00001.cookie: 0
41 dvcp.policies.00001.device: 00001
42 dvcp.policies.00001.disposition: secure
43 dvcp.policies.00001.name: Trusted Network
44 dvcp.policies.00001.resource: 10.32.91.0/24
45 dvcp.props.00000.cookie: 0
46 dvcp.props.00000.name: DVCP_Any
47 #dvcp.props.00000.precedence: dvcp
48 dvcp.props.00000.prefix: services.Any
49 dvcp.props.00000.services.Any.client_ports:
50 dvcp.props.00000.services.Any.comment:
51 dvcp.props.00000.services.Any.dvcp: true
52 dvcp.props.00000.services.Any.icon_name: any
53 dvcp.props.00000.services.Any.incoming.allowed.command:
54 dvcp.props.00000.services.Any.incoming.allowed.count: 10
55 dvcp.props.00000.services.Any.incoming.allowed.interval: 15
56 dvcp.props.00000.services.Any.incoming.allowed.log_level: none
57 dvcp.props.00000.services.Any.incoming.allowed.notification: no
58 dvcp.props.00000.services.Any.incoming.denied.command:
59 dvcp.props.00000.services.Any.incoming.denied.count: 10
60 dvcp.props.00000.services.Any.incoming.denied.hostile: no
61 dvcp.props.00000.services.Any.incoming.denied.interval: 15
62 dvcp.props.00000.services.Any.incoming.denied.log_level: debug
63 dvcp.props.00000.services.Any.incoming.denied.notification: no
64 dvcp.props.00000.services.Any.incoming.filter: allow
65 dvcp.props.00000.services.Any.incoming.hosts.external: dvcp_nets
66 dvcp.props.00000.services.Any.incoming.hosts.internal: dvcp_local_nets
67 dvcp.props.00000.services.Any.incoming.nat:
68 dvcp.props.00000.services.Any.outgoing.allowed.command:
69 dvcp.props.00000.services.Any.outgoing.allowed.count: 10
70 dvcp.props.00000.services.Any.outgoing.allowed.interval: 15
71 dvcp.props.00000.services.Any.outgoing.allowed.log_level: none
72 dvcp.props.00000.services.Any.outgoing.allowed.notification: no
73 dvcp.props.00000.services.Any.outgoing.denied.command:
74 dvcp.props.00000.services.Any.outgoing.denied.count: 10
75 dvcp.props.00000.services.Any.outgoing.denied.interval: 15
76 dvcp.props.00000.services.Any.outgoing.denied.log_level: debug
77 dvcp.props.00000.services.Any.outgoing.denied.notification: no
78 dvcp.props.00000.services.Any.outgoing.filter: allow
79 dvcp.props.00000.services.Any.outgoing.hosts.external: dvcp_nets
80 dvcp.props.00000.services.Any.outgoing.hosts.internal: dvcp_local_nets
81 dvcp.props.00000.services.Any.port_number:
82 dvcp.props.00000.services.Any.protocol: Any
83 dvcp.security.00000.cookie: 0
84 dvcp.security.00000.esp.alg: 2
85 dvcp.security.00000.esp.authalg: 2
86 dvcp.security.00000.life.kbytes: 8192
87 dvcp.security.00000.life.seconds: 86400
88 dvcp.security.00000.name: Strong with Authentication
89 dvcp.security.00000.type: ESP
90 dvcp.security.00001.cookie: 0
91 dvcp.security.00001.esp.alg: 1
92 dvcp.security.00001.esp.authalg: 1
93 dvcp.security.00001.life.kbytes: 8192
94 dvcp.security.00001.life.seconds: 86400
95 dvcp.security.00001.name: Medium with Authentication
96 dvcp.security.00001.type: ESP
97 dvcp.security.00002.cookie: 0
98 dvcp.security.00002.esp.alg: 1
99 dvcp.security.00002.esp.authalg: 0
100 dvcp.security.00002.life.kbytes: 8192
101 dvcp.security.00002.life.seconds: 86400

```

102 dvcp.security.00002.name: Medium  
103 dvcp.security.00002.type: ESP  
104 dvcp.tunnels.00001.cookie: 7537608  
105 dvcp.tunnels.00001.name: barf91-barf94  
106 dvcp.tunnels.00001.nameservice:  
107 dvcp.tunnels.00001.policies.000: 00001  
108 dvcp.tunnels.00001.policies.001: 00000  
109 dvcp.tunnels.00001.security: 00000

TABLE 3

Lines 1-17 contain information about a security device at a first end of the new VPN. Lines 18-33 similarly contain details about the security device at the second end of the new VPN. Lines 35-39 contain information about the first end's participation in the VPN, while lines 40-44 contain information about the second end's participation in the VPN. In some embodiments, this section of the template may list more than two ends for the VPN. In this embodiment, the equivalent of a VPN cloud is established by the facility: separate VPNs between each pair of ends, all of these VPNs sharing the same characteristics and therefore acting as a single VPN cloud. Lines 45-82 contain service properties merged into the configuration. Lines 83-103 contain security properties merged into the configuration.

It will be understood by those skilled in the art that the above-described facility could be adapted or extended in various ways. For example, the facility may manage properties for establishing VPNs of all different types and may, in fact, manage properties for a variety of other purposes. While the foregoing description makes reference to preferred embodiments, the scope of the invention is defined solely by the claims that follow and the elements recited therein.